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INTRODUCTION.

This REVIEW is based on reports for January, 1892, from 2,649 regular and voluntary observers. These reports are classified as follows: 157 reports from Weather Bureau stations; 103 reports from United States Army post surgeons; 1,736 monthly reports from state weather service and voluntary observers; 31 reports from Canadian stations; 217 reports through the Cen-

tral Pacific Railway Company; 405 marine reports through the co-operation of the Hydrographic Office, Navy Department; marine reports through the "New York Herald Weather Service;" monthly reports from local weather services established in all states and territories, except Idaho, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

CHARACTERISTICS OF THE WEATHER FOR JANUARY, 1892.

The month was colder than usual in the east-central and southeastern districts and over the interior of the middle and southern plateau regions, the most marked departure below the average temperature for January being noted from Lower Michigan to the Gulf of Mexico, where it was more than 4°. Over the extreme northeastern and northern districts, from the southeastern slope of the Rocky Mountains over the British Northwest Territory, and in the Pacific coast states the mean temperature was above the normal, the greatest excess appearing on the northeastern slope of the Rocky Mountains, where it was 5° to 10°.

Nine warm and seven cold waves advanced over districts east of the Rocky Mountains. Two of the warm waves were especially noteworthy. One appeared over Alberta on the 18th and advanced thence to the Atlantic coast by the 21st, and the other moved from the north Pacific coast to the Alleghany Mountains from the 29th to 31st. During the 19th the temperature rise was more than 50° over Montana, and a rise of 69° in six hours was reported at Glendive, Mont. The warm wave of the 29th-31st was attended by the highest temperature on record for January at points on the northeastern and middle-eastern slopes of the Rocky Mountains. The principal cold wave of the month appeared in the Northwest on the 16th, and reached the Atlantic coast the night of the 19-20th. Attending this cold wave the temperature fell 40° to 50° below zero in eastern Montana and North Dakota, and the line of zero temperature extended to northern Texas. Cold weather caused loss of stock on the ranges from Kansas to Texas, and vegetation on the west Gulf coast was killed by heavy frost. Heavy frost occurred as far south as Jupiter, Fla., the early part of the month.

PRECIPITATION.

The monthly precipitation was generally in excess of the January average in the Atlantic and east Gulf states, in a strip extending from the upper lake region to Missouri, and from the middle-eastern slope of the Rocky Mountains over the southern plateau region, the greatest excess being noted in the interior of the east Gulf states, where it was 5.00 to 13.00 inches. From the Pacific coast over the northern part of the plateau region, generally in the central valleys, and at stations along the immediate Atlantic coast from southern

New England to the Carolinas the monthly precipitation was deficient, the most marked deficiency occurring on the north Pacific coast and at Hatteras, N. C., where it exceeded 4.00 inches.

The heavy rains of the middle part of the month caused high water in the streams of the eastern and southeastern states, and in the Ohio, Tennessee, and Cumberland rivers and tributaries. Monthly snowfall of 50 inches, or more, was reported in the mountains of California and Idaho, and at Flagstaff, Ariz., Atlantic, Mich., and Constableville, N. Y.; and the snowfall exceeded 20 inches over a great part of the Lake region, and in the mountains of Colorado and Oregon. At the close of the month more than 10 inches was reported on the ground in northern New England, northern, central, and western New York, east-central Lower Michigan, northern Upper Michigan, eastern North Dakota, and from central Utah and northern Nevada over the northern plateau region. On the 21st the Rio Grande frontier of Texas was reported covered with snow.

STORMS.

On the 5th severe local storms occurred in the east Gulf and south Atlantic states. During the passage of a tornado over Fayetteville, Ga., 3 persons were killed, a number were injured, and property was destroyed to the value of \$30,000 to \$50,000. In Darlington county, S. C., several persons were injured, and a number of buildings were demolished by a tornado. Severe local storms occurred in Georgia and Florida on the 6th. At Oakland, Fla., a tornado caused considerable damage, and one person was killed by a falling building. On this date a heavy snowstorm, with high winds, prevailed over the middle Atlantic and New England states. From the 11th to 14th an exceptionally heavy rain and sleet storm extended from the east Gulf states over the Ohio Valley, the lower lake region, and the middle Atlantic and New England states, the precipitation assuming the form of snow in the more northern districts.

ICE IN RIVERS.

The upper Mississippi and middle and upper Missouri rivers were frozen throughout the month. The Mississippi River was frozen over at Saint Louis, Mo., and at points thence southward to Cairo, Ill., during a great part of the last half of the

month. The Detroit River was frozen over at Detroit, Mich., on the 15th. The Saint Clair River was frozen from Fort Gratiot, Mich., to Point Edward, Canada, on the 12th, and was frozen over at Port Huron, Mich., on the 27th. Navigation on the Ohio River was interrupted by floating ice.

AURORAS.

On the 5th auroras were reported over the northern part of the country from Washington to New England, and southward to Oklahoma Territory. Auroras were reported in the north-central and northeastern states on the 29th and 30th.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for January, 1892, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on Chart II by isobars.

The normal distribution of pressure for January shows values above 30.20 in two areas, one of which occupies the middle plateau region and the middle-eastern slope of the Rocky Mountains, and the other the interior of the south Atlantic states and eastern Tennessee. From these high areas the barometric gradient is marked northeastward to the Iceland low area and northwestward to the area of low pressure of Bering Sea, and the normal pressure is below 30.00 over the Gulf of Saint Lawrence and on the extreme north Pacific coast. In this month there is a general increase of pressure over the United States, and the highest pressure of the year usually obtains over parts of the middle-eastern and southeastern districts.

In January, 1891, the mean pressure was highest over the middle plateau region, where it was above 30.30, whence it decreased to about 30.05 on the south Pacific and extreme north Pacific coasts. The lowest mean pressure of the month was noted over eastern Canada and eastern New England, where it was below 30.00, from which region there was an increase of pressure to the south Atlantic and east Gulf states, where the mean values were above 30.15.

Chart IV shows that high pressure was persistent over the middle plateau, and Chart I shows that no low pressure areas traversed that region during the month.

A comparison of the pressure chart for January, 1892, with that of the preceding month shows an increase of pressure, except in districts east of the lower Mississippi River and south of the Lake region, and in California and southern Arizona. The greatest increase of mean pressure occurred from northern Missouri over Minnesota, the Dakotas, eastern Montana, and the British Possessions to the northward, where it exceeded .25, and the most marked decrease was noted along the Atlantic coast between the 33d and 39th parallels, where it was more than .15. Along the California coast south of the 38th parallel the decrease was .10.

The mean pressure was above the normal from the west Gulf states and the Mississippi Valley over the middle and northern plateau regions to the Oregon and Washington coasts, the most marked departure above the normal being shown in an area extending from the middle plateau to west Washington, where it was more than .10. Over the eastern and extreme southwestern parts of the country and in the British Possessions the mean pressure was deficient, and at stations in those districts the mean values were .05, or more, below the normal pressure for the month.

HIGH AND LOW AREAS.

The paths of well-defined areas of high and low pressure for January, 1892, are shown on Charts IV and I, respectively, and some of the more prominent characteristics of the high and low areas are noted in the table at the end of this chapter.

HIGH AREAS.

Ten high areas appeared, the average number traced for January during the last 17 years being 9. Two of the high areas advanced from the Pacific coast north of the 45th parallel; 4 first appeared over the British Northwest Territory; 3 apparently developed over the middle plateau region; and one passed northeastward from the lower Rio Grande valley.

One of the Pacific coast high areas, number V, traversed the continent, the average rate of advance being 26 miles per hour, and one of the high areas which appeared over the middle plateau region moved thence northwestward to western Washington and Oregon, thence to Alberta, thence along the eastern slope of the Rocky Mountains to southeastern Texas, and thence eastward over the north part of the Gulf of Mexico and Florida. High pressure prevailed during a great part of the month over the middle plateau region. Three of the high areas traced were offshoots from, and one of the Pacific coast high areas merged into, the permanent high area of the middle plateau. The high areas that appeared north of the 50th parallel generally moved southeastward after crossing the Rocky Mountains, and one high area moved eastward from the middle plateau region to the middle Atlantic states. The following is a description of the high areas referred to:

I.—The month opened with a ridge of high pressure extending from Manitoba to the south Pacific coast, which separated two low areas, one, number I, occupying the middle Mississippi valley, and the other, number II, the north Pacific coast. The pressure was also high off the middle Atlantic coast, high areas XI and XII for December, 1891, having moved to that region during the night of December 31–January 1st. High area I was central over Utah, with pressure above 30.50, and temperature below freezing was noted over the plateau region to the Mexican border, the lowest temperature of the month being recorded at Red Bluff, Keeler, and San Diego, Cal., and Yuma, Ariz., where it was 32°, 23°, 38°, and 32°, respectively. The high area remained nearly stationary over the middle plateau during the 2d and 3d, with pressure rising above 30.70 at Montrose, Colo., the evening of the 1st and the morning of the 2d. By the 4th it had shifted position to western Oregon, and passed thence north of Montana during the 5th. Moving rapidly southeastward along the eastern slope of the Rocky Mountains the center reached southeast Texas the night of the 6th, carrying the line of freezing weather to central Texas and the north part of the Gulf States. Passing eastward over the north Gulf the center passed over the north part of the Florida Peninsula the night of the 7th, with freezing weather along the immediate east Gulf coast and over northern Florida. The temperature continued low over the southeastern part of the country until the 9th. At Jacksonville, Fla., the temperature fell to 31° 7 the morning of the 8th, the lowest temperature of the season at that place, and vegetation was injured by cold as far south as Jupiter, Fla.

II.—Was central over Assiniboia the morning of the 1st, with pressure above 30.40, and temperature below zero over the Dakotas and eastern Montana, and an increase of pressure of .60 in 12 hours at Fort Smith, Ark. During the 2d the high area moved eastward over Manitoba, with freezing weather to central Texas and the interior of the Gulf States, and a temperature fall of more than 40° in 24 hours in western Ontario. The morning of the 3d the area was central north of Lake Superior, the line of freezing weather extended to the north part of the Florida Peninsula, and frost occurred as far south as Jupiter and Tampa, Fla. During the 4th this high area disappeared by a decrease of pressure north of the eastern Lake region. On this date the pressure was high, above 30.20, over the Florida Peninsula, and heavy frost caused great damage to vegetation as far south as Jupiter, Fla.

III.—The approach of this high area from the British Northwest Territory was shown by reports of the 7th, an increase of